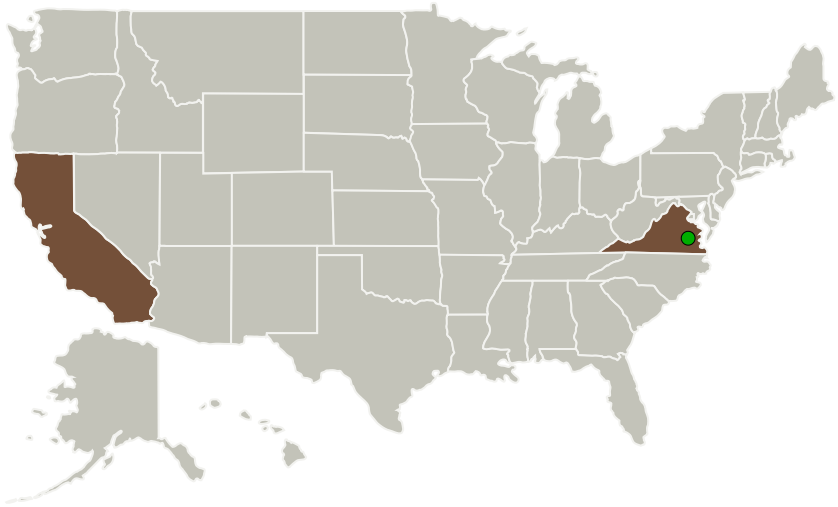
Penetrating Backscatter X-Ray Imaging System, Phase I

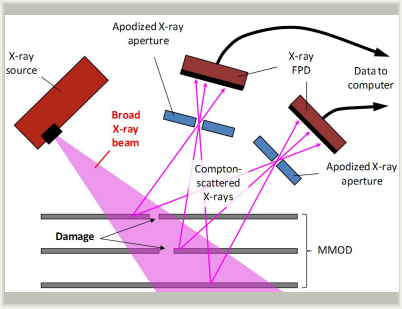
Completed Technology Project (2016 - 2016)

Project Introduction

To address NASA's need for advanced nondestructive evaluation (NDE) of complex built-up spacecraft structures, Physical Optics Corporation (POC) proposes to develop a new Penetrating Backscatter X-ray Imaging (PRAXI) system for in situ single-sided, three-dimensional (3D) NDE of the integrity of spacecraft components and structures. The PRAXI system is based on a novel approach for 3D Compton-based structural imaging, which requires only a small number of images for 3D data reconstruction. These new features enable PRAXI to achieve 10x faster operating speed, smaller form factor, and smaller weight, compared to Compton imaging tomography (CIT), previously developed by POC. The proposed PRAXI system will allow noncontact, single-sided inspection of various spacecraft structures (such as micrometeoroid and orbital debris (MMOD) shields, pressure vessels, inflatable habitats, and thermal protection systems), either for in-space NDE or for on-ground material development and quality control. In Phase I POC will demonstrate the feasibility of using the PRAXI system for NDE of spacecraft components by fabricating and testing a TRL-4 prototype, with the goal of achieving technology readiness level (TRL)-6 by the end of Phase II and delivering the prototype to NASA.

Primary U.S. Work Locations and Key Partners





Penetrating Backscatter X-Ray Imaging System, Phase I

Table of Contents

Penetrating Backscatter X-Ray Imaging System, Phase I

Completed Technology Project (2016 - 2016)

Organizations Performing Work	Role	Type	Location
Physical Optics Corporation	Lead Organization	Industry	Torrance, California
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Transitions

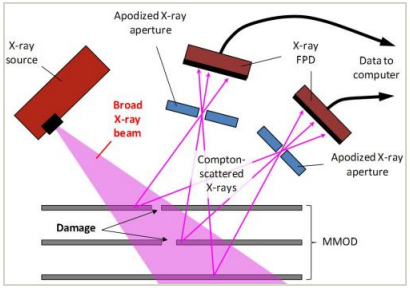
June 2016: Project Start

December 2016: Closed out

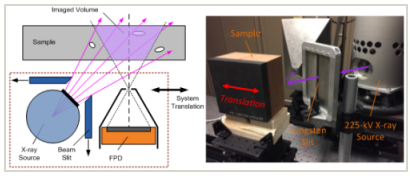
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139629)*

Images



Briefing Chart Image
Penetrating Backscatter X-Ray Imaging System, Phase I
(https://techport.nasa.gov/image/126701)



Final Summary Chart Image
Penetrating Backscatter X-Ray Imaging System, Phase I Project Image
(https://techport.nasa.gov/image/135516)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Physical Optics Corporation

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

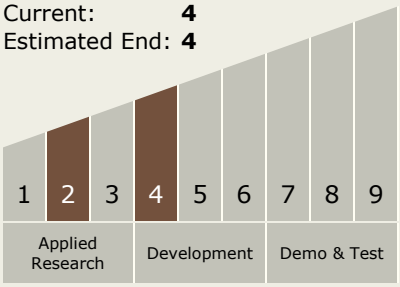
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Naibing Ma

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Penetrating Backscatter X-Ray Imaging System, Phase I

Completed Technology Project (2016 - 2016)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System